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Indian Standard

SPECIFICATION FOR ROUND OPEN TOP SANITARY CANS FOR FOODS AND DRINKS

PART 1 TINPLATE

(*First Revision*)

First Reprint JANUARY 1990

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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February 1988

Indian Standard

SPECIFICATION FOR ROUND OPEN TOP SANITARY CANS FOR FOODS AND DRINKS

PART 1 TINPLATE

(*First Revision*)

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Indian Standard

SPECIFICATION FOR ROUND OPEN TOP SANITARY CANS FOR FOODS AND DRINKS

PART 1 TINPLATE

(First Revision)

0. FOREWORD

0.1 This Indian Standard (Part 1) (First Revision) was adopted by the Bureau of Indian Standards on 24 July 1987, after the draft finalized by the Metal Containers Sectional Committee had been approved by the Marine, Cargo Movement and Packaging Division Council.

0.2 This Indian Standard, first published in 1979, contained material and other requirements for open top sanitary cans for thermally processed foods only. It has been revised in two parts, Part 1 covering the tinplate requirements and Part 2 covering the sizes and general requirements of open top sanitary (OTS) cans. This revision also includes the OTS cans for non-thermally processed foods and drinks like synthetic beverages, infant milk foods, malted milk, instant coffee, instant tea, condensed and evaporated milk, etc, for which the tinplate requirements are not as severe as for thermally processed foods and drinks. Material requirements have been thoroughly revised with respect to base plate composition and tincoating requirements. Tincoating requirements have been specified according to the nature of the product and its processing requirements. However, the canner is advised to establish the suitability of the lacquer for his product through storage studies before its selection.

1. SCOPE

1.1 This standard (Part 1) covers the requirements for tinplate for round open top sanitary (OTS) cans used for the packing of thermally and non-thermally processed foods and drinks.

2. TERMINOLOGY

2.1 For the purpose of this standard, the terms defined in IS : 1993-1982*, IS : 11104-1984† and IS : 9396 (Part 2)-1987‡ shall apply.

3. TINPLATE REQUIREMENTS

3.1 The cans shall be made of first grade (prime, as defined in IS : 1993-1982*) electrolytic tinplate of baseplate, MR or L type with the chemical composition as under:

Element	*Type MR percentage* *Max*	*Type L percentage* *Max*
C	0·13	0·13
Mn	0·60	0·60
P	0·02	0·015
S	0·05	0·05
Si	0·01	0·01
Cu	0·20	0·06

NOTE — MR — Medium residual; L — Low metalloid.

3.1.1 For thermally and non-thermally processed food products, MR type baseplate may be used. Use of type L baseplate is recommended for highly agressive products and special applications.

3.2 Tinplate Thickness and Dimensions — A can shall be made of tinplate of thickness as specified in Tables 1 and 2 of IS : 9396 (Part 2)-1987‡. Alternatively, for export of thermally processed food cans, tinplate of lower thickness for the body may be used for beaded cans made from conventional tinplate or straight walled cans made from double reduced tinplate. The reduced body and end thickness shall be as agreed to between the purchaser and the supplier. The tolerance and method of measurement of tinplate thickness shall be as given under **10.1** of IS : 1993-1982*. Tolerance on linear dimension of the tinplate shall be according to **10.2** and **10.3** of IS : 1993-1982*.

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*Specification for cold-reduced tinplate and cold-reduced blackplate (*second revision*).

†Glossary of terms relating to open top sanitary cans.

‡Specification for round open top sanitary cans for foods and drinks: Part 2 Sizes and general requirements.

3.3 Tincoating — The minimum tincoating for various products shall be as under:

a) The minimum tincoating for fruit and vegetable products shall be as given below:

Body — D 11·2/5·6 with the higher tincoating on the inside-plain or lacquered, and lower tincoating on the outside-lacquered or lithographed.

Ends — E 5·6/5·6 both internally and externally lacquered. If internally plain ends are to be used, then the tin coating shall be D 11·2/5·6 with the higher tincoating on the inside and lower tincoating on the outside-lacquered or lithographed.

b) For low and non-acidic products like fish and meat, the minimum tincoating for the body and the ends shall be E 5·6/5·6 both internally lacquered and externally lacquered or lithographed.

c) For non-thermally processed foods like dairy products, coffee powder, instant tea, etc, tincoating shall be E 2·8/2·8 both for body and ends. The inside may be plain or lacquered and the outside shall be lacquered or lithographed.

The tincoating grades given above correspond to tincoating mass in g/m^2 for electrolytic plate as given in Table 1 of IS : 1993-1982*.

3.3.1 The can ends may also be made of tin free steel sheet lacquered externally and internally for non-thermally processed food cans.

3.4 Surface Finish — The tinplate used shall be in bright finish with the surface roughness between 0·1 and 0·3 micrometer CLA (centre line average). Tinplate with stone finish with surface roughness between 0·20 and 0·45 micrometer CLA may also be used. Plate shall also be free from major surface defects like white patches, matt patches, white powder, deep scratches, untinned spots, wood grain finish, patchy/excess oil, quenching and water stains.

3.5 Tin Grain Size — For internally plain cans with tincoating of 8·4 g/m^2 and above on the higher tincoating side, to be used for thermally processed and acidic/corrosive products, the tin grain size of tincoating shall correspond to size No. 9 or less numerically when determined in accordance with the method given in Appendix A.

3.6 Iron Solution Value — The iron solution value where the inside tincoating requirement is 8·4 g/m^2 and above shall be 20 microgram (*Max*). The iron solution value shall be determined by the method given in Appendix B.

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*Specification for cold-reduced tinplate and cold-reduced blackplate (*second revision*).

3.7 Surface Oil — Tinplate surface shall be oiled with cottonseed oil or dioctyl sebacate. Oil film mass on the tinplate shall not be more than 12 mg/m^2 (both sides together) and oil shall be uniformly distributed on the sheets.

3.8 Passivation Treatment — The tinplate may be subjected to passivation treatment as agreed to between the purchaser and the supplier. Passivation treatment 311 with chrome level in the passivation layer in the range of 0·5 ± 0·15 microgram/cm^2 is recommended.

3.9 The tinplate shall meet the requirements of shape as detailed under **10.3** of IS : 1993-1982*.

3.10 The tinplate shall meet the requirements given in **8** of IS : 1993-1982* in respect of other mechanical properties.

4. SAMPLING

4.1 To ascertain compliance with the requirements of this Indian Standard the procedure given in **11.1.1** and **11.1.2** of IS : 1993-1982* should be adopted.

5. PACKING AND MARKING

5.1 Tinplate or tin free steel sheet for OTS cans shall be packed as per details given in **16** and **17** of IS : 1993-1982*.

5.2 A metal tag, giving the following information shall be provided on the outside of bulk package to identify the contents:

SPECIMEN OF METAL TAG

Coil No. and source :

Packet No. :

Size and thickness :

Tincoating :

Temper :

No. of sheets packed :

Net weight :

Gross weight :

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*Specification for cold-reduced tinplate and cold-reduced blackplate (*second revision*).

5.2.1 The material may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions, under which a licence for the use of the Standard Mark may be granted to manufacturers or producers, may be obtained from the Bureau of Indian Standards.

APPENDIX A

(*Clause* 3.5)

METHOD FOR CHECKING OF TIN GRAIN SIZE

A-1. OUTLINE OF METHOD

A-1.1 Tin grain size is revealed by acid etching of a prepared disc/panel of the sample in a test solution.

A-2. MATERIAL

A-2.1 Test Disc/Panel — A disc/panel of suitable size punched out from a hand press prepared by de-greasing with acetone.

A-2.2 Test Solution — A solution prepared by mixing 100 g of ferric chloride crystals and 0·5 to 1·0 g of sodium sulphide dissolved in 1 litre of water.

A-3. PROCEDURE

A-3.1 Immerse the test disc/panel in the test solution for 5 to 15 seconds, take out and rinse in water.

A-3.2 Compare the crystal structure of the disc/panel, that is, revealed with those given in Fig. 1 and grade accordingly.

A-3.3 The correct numerical grade shall be No. 9 or less.

APPENDIX B

(*Clause* 3.6)

METHOD FOR DETERMINATION OF IRON SOLUTION VALUE

B-1. OUTLINE OF METHOD

B-1.1 The iron solution value measures in micrograms the total amount of iron dissolved when an area of 19·35 cm² of tinplate surface is exposed to 50 ml of test solution for 2 hours at 27 ± 2°C.

B-2. MATERIAL

B-2.1 Test Disc — A tinplate disc of 50 mm diameter punched out by a hand press from the tinplate in sheet form in as received condition.

B-2.2 Test Solution — A solution prepared by mixing the following:

- a) 23 ml of 2·18 N sulphuric acid (AR grade),
- b) 2 ml of 3 percent hydrogen peroxide [AR grade (10 volume oxygen)], and
- c) 25 ml of 4 percent ammonium thiocyanate (AR grade).

B-2.3 Standard Test Bottles — Bottles with 63 mm lip diameter.

B-3. PROCEDURE

B-3.1 Cathodically clean the tinplate disc in 1 percent sodium carbonate solution at a current density of 0·08 A/cm² for 30 seconds. Rinse the disc in distilled water and dry.

B-3.2 Place the disc in the cap of a standard test bottle and secure with PVC gasket.

B-3.3 Apply a thin layer of silicone grease (Metroark 211 compound) on the lip of the bottle to prevent leakage of the test solution.

B-3.4 Screw the cap containing the test disc firmly on to the bottle.

B-3.5 Invert the bottle and allow to stand for 2 hours at 27°C without agitation.

B-3.6 Place the bottle upright, remove the specimen, add 1 ml of 3 percent hydrogen peroxide and swirl again.

B-3.7 Prepare a standard calibration curve by measuring the optical densities of solution of known iron concentrations.

B-3.8 Determine the iron content of the solution by colorimetric technique using the standard calibration curve for comparison.

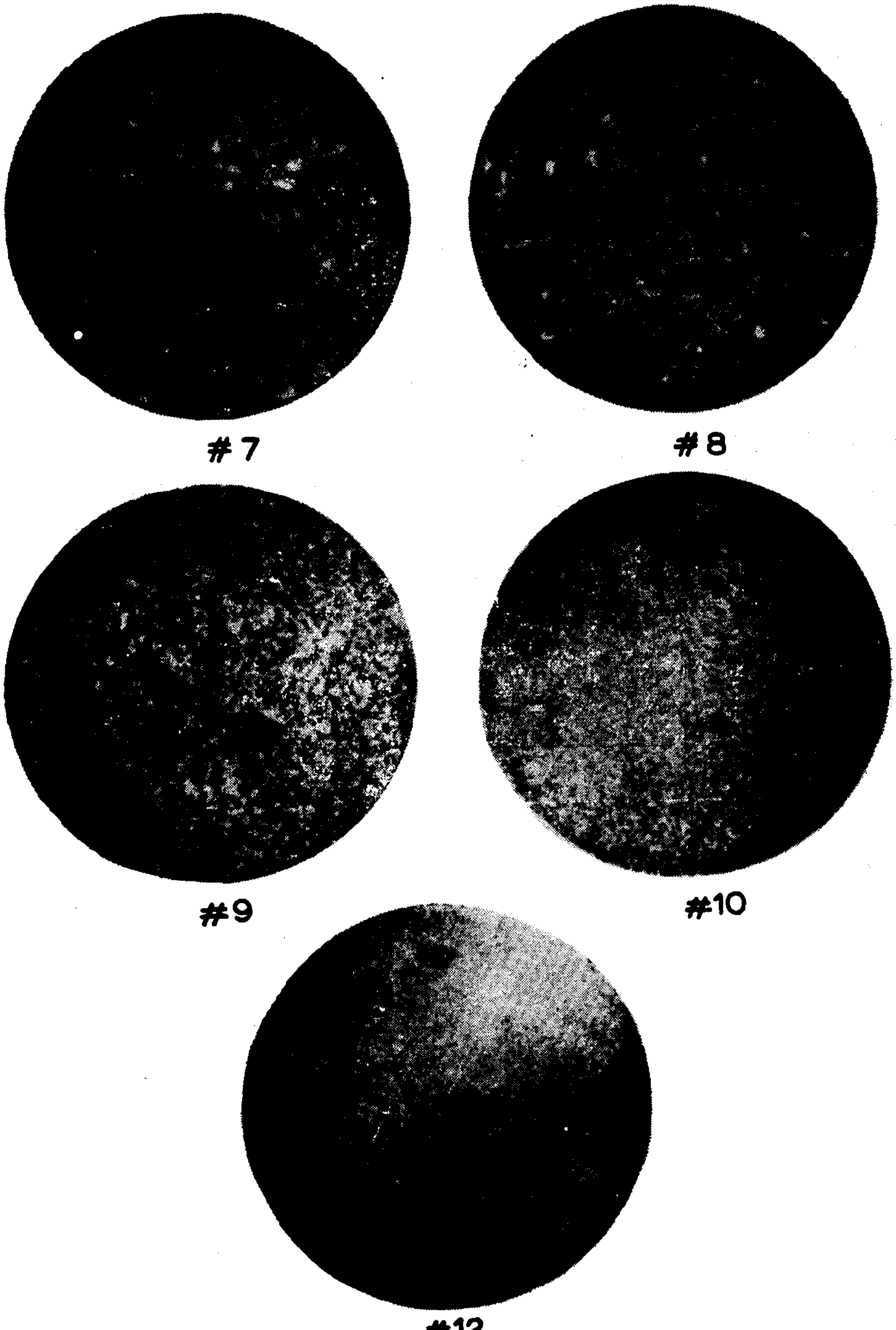

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FIG. 1 STANDARD TIN GRAIN SIZES

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Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Definition*
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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